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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/038,782	12/31/2001	Roger E. Frech	OU 3721.1	4101

321 7590 10/12/2006

SENNIGER POWERS
ONE METROPOLITAN SQUARE
16TH FLOOR
ST LOUIS, MO 63102

EXAMINER

CANTELMO, GREGG

ART UNIT	PAPER NUMBER
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1745

DATE MAILED: 10/12/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/038,782	Applicant(s) FRECH ET AL.	
	Examiner Gregg Cantelmo	Art Unit 1745	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 26 July 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☒ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-4,6-40,42-50,52,53,55-57,59-61,63-66,68-70 and 72-77 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 1-4,6-40,42-50,52,53,55-57,59-61,63-66,68-70 and 72-77 is/are allowed.
- 6) ☐ Claim(s) _____ is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

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DETAILED ACTION

1. This application is in condition for allowance except for the following formal matters:

The incorporation of essential material in the specification by reference to an unpublished U.S. application, foreign application or patent, or to a publication is improper. Applicant is required to amend the disclosure to include the material incorporated by reference, if the material is relied upon to overcome any objection, rejection, or other requirement imposed by the Office. The amendment must be accompanied by a statement executed by the applicant, or a practitioner representing the applicant, stating that the material being inserted is the material previously incorporated by reference and that the amendment contains no new matter. 37 CFR 1.57(f). See pages 52 and 53 to various publications which are incorporated by reference.

Prosecution on the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

A shortened statutory period for reply to this action is set to expire **TWO MONTHS** from the mailing date of this letter.

Allowable Subject Matter

2. Claim 1-4, 6-40, 42-50, 52, 53, 55-57, 59-61, 63-66, 68-70 and 72-77 are allowed.
3. The following is an examiner's statement of reasons for allowance:

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With respect to claims 1-4, 6-39, 57, 59, 60 and 74-77 none of the prior art of record are considered to teach, suggest or render obvious the electrolyte as defined therein which is inert to lithium metal. Applicant's arguments and declaration state that the polymer electrolyte of JP '306 is not inert to lithium metal. In particular applicant states: It is noted that JP '306 references forming a cross-linked polyethyleneimine using a polyfunctional epoxy cross-linking agent, and using this cross-linked polymer with an inorganic electrolyte, that may include lithium. However, the mere fact that JP '306 mentions the possible use of the cross-linked polymer with a lithium-containing electrolyte does not mean that the cross-linked polymer is inert to lithium metal. Notably, JP '306 makes no reference to the polymer electrolyte prepared therein being inert to lithium. In fact, as further detailed in the Declaration of Daniel T. Glatzofer being submitted simultaneously with this Amendment C, Applicants respectfully submit that cross-linking a branched polyethyleneimine with an epoxy compound does not result in the formation of a cross-linked polymer electrolyte that is inert to lithium metal. Rather, if a primary or secondary amine moiety is reacted with a diepoxide cross-linker, as set forth in JP '306, 13-hydroxyamine groups are formed. These 13-hydroxyamine groups will react with metallic lithium, the groups being reduced to form lithium alkoxides, and thus are not inert thereto. Therefore the product of these claims are structurally different from that of JP '306.

With respect to claims 40, 42-50, 52, none of the prior art of record are considered to teach, suggest or render obvious the electrolyte as defined therein with

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one or more solvent moieties covalently bound to one of the identified electrolyte components of the claims.

With respect to claims 53, 55 and 56 none of the prior art of record are considered to teach, suggest or render obvious the electrolyte as defined therein further including labile protons therein in the absence of a protic solvent. Applicant's arguments and declaration state that the polymer electrolyte of JP '306 is not inert to lithium metal. In particular Applicant states: It is further noted, however, the Office does not state that the electrolyte disclosed in JP '306 comprises labile protons in the absence of a protic solvent. Applicants respectfully submit this is because JP '306 in fact makes no reference to such an electrolyte. Applicants further submit that not all cross-linked polyalkyleneimines contain labile protons in the absence of a protic solvent. (See, e.g., page 35, lines 3-12 of the present application, as well as page 6, third full paragraph of Applicants' Letter to the Patent Office of March 3, 2005). In the case of JP '306, and as further detailed in the above-noted Declaration, if a primary or secondary amine moiety is reacted with a diepoxide cross-linker, as set forth in JP '306, 13-hydroxyamine groups are formed. The resulting cross-linked polymer electrolyte is therefore not inherently protonated, and thus does not inherently contain labile protons in the absence of a protic solvent, because the hydrogen atoms that are part of the 13-hydroxyamine groups are not sufficiently acidic to have labile protons.

With respect to claims 61 and 63-65, none of the prior art of record appears to teach, fairly suggest or render obvious the invention of claim 61. In particular: of the

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gradient battery comprising both electrodes comprising a cross-linked poly(amine) in combination with the electrolyte defined therein.

With respect to claims 66 68-70 and 72-73, none of the prior art of record appears to teach, fairly suggest or render obvious the invention of these claims. In particular: of the claimed polymer single ion electrolyte including the ion pair with one member covalently attached to the polymer backbone and the other being capable of diffusing through the electrolyte upon application of an electric field. Applicant's arguments and declaration state that the polymer electrolyte of JP '306 is not inert to lithium metal. In particular Applicant states:

It is noted that JP '306 references forming a cross-linked polyethyleneimine using a polyfunctional epoxy cross-linking agent, and using this cross-linked polymer with an inorganic electrolyte, such as one that contains lithium. However, the mere fact that JP '306 mentions the use of the cross-linked polymer disclosed therein with an electrolyte, such as one that contains lithium, does not mean that the cross-linked polymer electrolyte contains an ion pair, wherein one member of the pair is covalently attached to the polymer backbone and the other is capable of diffusing through the polymer electrolyte upon the application of an electrical field. Notably, JP '306 makes no reference to the polymer electrolyte prepared therein containing such an ion pair. In fact, Applicants respectfully submit that cross-linking a branched polyethyleneimine with an epoxy compound in the presence of an inorganic electrolyte does not result in the formation of a cross-linked polymer electrolyte that contains such an ion pair, wherein one member of the pair is covalently attached to the polymer backbone and the other is

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capable of diffusing through the polymer electrolyte. Rather, as detailed in the above-noted Declaration, JP '306 discloses a conventional electrolyte, wherein both the anion and cation of the salt diffuse, or are capable of diffusing, through the electrolyte upon the application of an electric field.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Conclusion

4. This application is in condition for allowance except for the previous formal matters identified above.

Prosecution on the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

A shortened statutory period for reply to this action is set to expire **TWO MONTHS** from the mailing date of this letter.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Gregg Cantelmo whose telephone number is 571-272-1283. The examiner can normally be reached on Monday to Thursday, 8:00-5:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Pat Ryan can be reached on 571-272-1292. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

A handwritten signature in black ink, appearing to read "Gregg Cantelmo", with a stylized flourish at the end.

gc

October 2, 2006

Gregg Cantelmo
Primary Examiner
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